

Implementation of Computer Aided Home Energy Management System

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Abstract

In a competitive market, electricity price is very high when the power system faces peak loads. Thus, price can indicate the risk of the power system and provide a signal for the residential customers to manage their electricity demand during peak load periods. Computer-Aided Home Energy Management (CAHEM) system is based on the real-time price responsive load management concepts in which the residential customer can reduce or shift the peak load in response to the real time prices. It receives hourly price signals from the utility over internet and the smart controller automatically controls the residential appliances, including air conditioner, water heater, washer/dryer, dishwasher and lights, so as to shift the loads from peak to off-peak hours while maintaining reasonable comfort for the customer. The load shifting takes into account load and temperature data in addition to the price signals. The impacts of price responsive load management with CAHEM were simulated using the temperature, load and price data in the 1999 PJM market. The simulation results show that peak load reduction of about 3-5% (~1.5-3 GW) can be achieved with the CAHEM which is sufficient to improve system reliability and to reduce price spikes.